IATSS Research xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

IATSS Research

Modelling loyalty and behavioural change intentions of busway passengers: A case study of Brisbane, Australia

Sui Tao [a,*], Jonathan Corcoran [b], Iderlina Mateo-Babiano [b]

[a] Institute of Future Cities, The Chinese University of Hong Kong, Hong Kong
[b] School of Geography, Planning and Environmental Management, The University of Queensland, Australia

ARTICLE INFO

Available online xxxx

Keywords:
Public transport
Loyalty
Captivity
Attitudes
Modal choice behaviour

ABSTRACT

Understanding public transport passengers' loyalty has received growing research attention, given its potential to inform the long-term market management of a public transport service. However, the nature of public transport passengers' loyalty is arguably yet to be fully understood concerning its relationship to passengers' captivity and attitudes towards private car use, and their intentions to change their modal use. Hence questions remain largely unexplored that: Is public transport passengers' loyalty a result of a preferred or constrained choice? And does their loyalty have the potential to encourage more sustainable transport modal use patterns? Drawing on the busway network in Brisbane, Australia, as the case study, this paper aims to broaden the research on public transport passengers' loyalty by addressing these questions. Through developing a series of linear regression models, our findings highlight: (1) busway passengers were influenced by preferential (the experience of riding the busway service), moral (pro-environmental concerns) and constraint (cost of busway and car use) considerations; and (2) the potential of loyalty to alleviate busway passengers' intentions to shift to private car use for their trip-making. Through these findings, a series of implications are developed with the potential for the improvement of busway service and travel demand management to encourage more sustainable transport especially within a highly motorised context. Future research is encouraged to provide more evidence concerning passenger loyalty and their public transport use.

1. Introduction

With the global rapid rise in private motorised transport over the past six decades, sustainable transport alternatives such as public transport has been struggling to compete with private cars to fulfil individual travel needs [1]. This has resulted in a number of serious urban problems, including congestion, environmental pollution and social inequity, and threatens the survival of public transport [1,2]. It has been highlighted that transport policies that seek to manage people's travel demand and behaviour, particularly those encouraging public transport use while reducing car dependency, have the greatest potential to encourage sustainable transport [3,4].

Understanding public transport passengers' loyalty (or the intention or willingness to use a public transport service) as a means to inform the long-term marketing of public transport services has received growing research attention [5,6]. It has been argued that loyal passengers will continue using a public transport service without seeking or shifting to alternative options [7,8]. Hence attaining and sustaining passenger loyalty becomes an effective strategy in gaining long-term financial advantage especially within the context of a highly competitive public transport service market [8]. Recent studies which investigated public transport passengers' loyalty and the underpinning attitudinal mechanisms revealed that a variety of attitudinal factors including passengers' previous service experience, satisfaction, and pro-environment responsibilities may have significant influence on passenger loyalty to a public transport service, providing evidence basis for maintaining and enhancing patronage [9–11].

Despite insights obtained from previous research, the nature of public transport passengers' loyalty is arguably yet to be fully understood, particularly concerning its relationship to passengers' captivity and attitudes towards private car use (e.g., utility, comfort, cost), and their intentions to change their modal use, in particular, increase or decrease their public transport or private car use. These relationships bear critical importance to the improvement of public transport management and promoting sustainable transport, as private cars has continually served as a key barrier towards promoting public transport use in an

* Corresponding author at: 406B, Wong Foo Yuan Building, Chung Chi College, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong.
E-mail addresses: s.tao@cuhk.edu.au, tsd_1987@126.com (S. Tao), jj.corcoran@uq.edu.au (J. Corcoran), i.mateobabiano@uq.edu.au (I. Mateo-Babiano).
Peer review under responsibility of International Association of Traffic and Safety Sciences.

http://dx.doi.org/10.1016/j.iatssr.2016.10.001

increasingly car-dependent society [12–14]. Despite their apparent significance, scholarly evidence on these issues has been sporadic. To bridge these gaps, this paper addresses two questions: Is public transport passengers' loyalty a result of a preferred or constrained choice? And does their loyalty have the potential to encourage more sustainable transport modal use patterns? We assume that by doing so, this paper will contribute to a new evidence base that can be obtained to better guide future transport policy targeted at public transport passengers' loyalty within a highly motorised context.

The remainder of the paper is structured as follows: Section 2 provides a brief overview of the related literature and highlights the key knowledge gaps, before proposing research hypotheses. Section 3 introduces the study context and data used. Section 4 presents the results from a modelling exercise of busway passengers' loyalty and related attitudinal factors. Section 5 discusses the key findings and implications for transport policy-making, limitations and possible future research, before drawing some tentative conclusions in Section 6.

2. Research background

Loyalty (or a re-patronising behavioural intention) is defined as *'a deeply held commitment to rebuy or repatronize a preferred product/service consistently in the future'* (Oliver [16], Page 34). The concept has been widely applied in service marketing studies as an important indicator of customers' re-purchasing behaviour within various service contexts [15]. The 'loyalty' concept emphasises on the preferential component of customer behaviour, which has the potential to distinguish regular customers who are attitudinally loyal towards a service from those who are spuriously loyal, i.e., re-patronising a service due to conditional constraints, such as lack of alternative options, socio-economic status, instead of attitudinal preference [16–18]. Hence, effectively measuring and managing customer loyalty would allow service providers to employ a more targeted approach to marketing management, thereby better securing and sustaining customers against their competitors.

The concept of loyalty has also been introduced in transport research to better the market of public transport users [5,6,8]. Traditionally public transport providers focused on objective indicators such as regularity (i.e., use a transport mode on a regular or irregular basis) and captivity (i.e., with or without more than one travel option at their disposal) of passengers to identify 'loyal' passengers. It was assumed that passengers who use a public transport service repeatedly and have no other transport options (particularly cars) are loyal, e.g., [19,20,21]. However, such an approach to understand a public transport market might be oversimplified with the potential to generate misleading implications for public transport providers to maintain their market share [5,6]. For example, some passengers may use public transport for their daily trip-making due to certain situational constraints (e.g., not owning a car or lack of parking at the destination), and are likely to shift modal use due to accumulating unpleasant experiences of riding the public transport or experiencing change of personal circumstances (e.g., purchasing a car) [6,22,23]. Following these arguments, some researchers focused on examining the attitudinal aspect of passenger loyalty. For example, Foote [5] examined the loyalty of passengers within the public transport (rail and bus) system of Chicago in relation to their public transport use characteristics, highlighting that infrequent public transport passengers were more loyal than their frequent counterparts with higher willingness to continue using a public transport service. Similar findings were reported in a Canadian study by Jacques et al. [24] that found public transport passenger with similar trip patterns showed different levels of satisfaction. In another related study, Anable [23] identified frequent yet reluctant bus passengers who used bus services due to situational restraints such as financial or healthy issues instead of holding favourable attitudes towards the local bus service.

An increasing number of recent studies have also investigated the underpinning attitudinal mechanisms of public transport passengers' loyalty within various public transport contexts, including coach service [9,25], bus public transport [10,26], metro [8,10], and paratransit [27]. In accordance with the service marketing literature, these studies have shown that factors that captured passengers' service experience, including satisfaction, perceived service quality and value, importantly affect public transport passengers' loyalty. Significant influence was found for some other service-related factors including switching costs [25] and involvement [8] as well. Apart from focusing on service-related factors, quite a few studies also drew on socio- and environment psychological theories, particularly the theory of planned behaviour [28] and norm-activation model [29], to investigate the effects of other attitudinal factors such as environmental concerns, social norm, on public transport passengers' loyalty, e.g., [30,31,32]. Their findings indicated that these attitudinal variables were also able to increase public transport passengers' loyalty, given the relevance of individual's public transport use to a broader to social and ecological context (e.g., less air pollution compared to private motorised transport).

Despite the insights derived from previous studies, the current understanding of public transport passengers' loyalty has arguably been limited concerning its relationships to passengers' considerations of private car use and intentions to change modal use. As shown in previous research [33–36], individual's choice and use of a given transport mode are influenced by one's considerations regarding the availability and utility of a set of travel options. Such considerations of alternatives may in turn impose potential effects on one's decision and consequently, loyalty of using a public transport service. For example, a commuter might become more loyal towards a public transport service due to less attractive alternative services, e.g., [7]. Among other travel options, private cars should be paid with particular attention, as it has been persistently shown to be a key barrier for promoting public transport use globally [12–14]. Given this, investigating public transport passengers' loyalty in relation to their captivity and attitudes towards private car use has the potential to further clarify whether their loyalty is a preferred choice or a constrained one particularly in face of car dependency. Following this question, it appears reasonable to also ask whether attaining public transport passengers' loyalty has the potential to encourage more sustainable modal use patterns, or solely leveraging transportation service competition.

The issues discussed above clearly relate to the improvement of public transport management and promoting more sustainable urban transport especially within a highly motorised context. Few studies, e.g., [5], have examined the effects of captivity of private car use on public transport passengers' loyalty. And none to our knowledge have investigated the effects of loyalty on public transport passengers' behavioural change intentions concerning their modal use. Bridging these gaps, therefore, underpins the impetus of this study. Before moving onto the next section, one additional point and research hypotheses need to be clarified. While in the service marketing literature, loyalty has been argued to entail a variety of attitudinal aspects including positive recommendation via good word-of-mouth, identification with the service provider [15,37], in this paper, we employed a narrower definition. Loyalty was only referred to passengers' willingness to continue using a public transport service, given its apparent relevance to modal choice behaviour. Similarly, behavioural change intentions of public transport passenger were concerned with their willingness to shift to private car use and increase public transport use. Based on these propositions, two main hypotheses were proposed and tested in the empirical examination:

- Public transport passengers' captivity of and negative attitudes towards private car use will encourage their loyalty towards the public transport service;
- Public transport passengers' loyalty towards a public transport service

Please cite this article as: S. Tao, et al., Modelling loyalty and behavioural change intentions of busway passengers: A case study of Brisbane, Australia, IATSS Research (2016), http://dx.doi.org/10.1016/j.iatssr.2016.10.001

will discourage their willingness to shift to private car use while encouraging the willingness to increase public transport use.

3. Methods

3.1. Study context

The busway network of Brisbane, Australia served as the study context. Brisbane is the capital city of the Queensland state located on the eastern coast of Australia. It is the third largest Australian city with a population of approximately two million within its greater metropolitan area that comprises multiple municipalities [38]. In this study, we solely focus on Brisbane's core city area – the local city council area, which houses the largest population cluster (around one million persons) in Queensland and is home to the busway network (Fig. 1). As with other major Australian cities, the Brisbane city is characterised by high private vehicle (mainly cars) ownership and high private car use. Recent data indicates that, nearly 80% of all households in Brisbane own at least one private vehicle [38], and over 85% of people's daily trips is made by cars, whilst public transport accounts for around 8% of those daily trips [39,40]. Within the public transport sector, Brisbane city's bus public transport network, comprising over 400 routes and 10,000 stations, has accounted for approximately 54% of all public transport usage (measured by passenger-kilometres), with the rest mostly catered by rail public transport [40].

Brisbane's busway network operates as a core component of its bus public transport network. It consists of three continuous exclusive busway sections: the South East Busway (SEB), the Northern Busway (NB) and the Eastern Busway (EB), with a total length of 31.4 km [41]. Collectively, they serve to channel bus services around Brisbane into its central business district (CBD) and surrounding areas. A total of 27 stations exclusively serve the busway network, which are characterised by more spacious platform and weather-protected shelter compared to other on-road bus stops [42]. The stop-spacing of the busway stations ranges from 670 m to 1650 m; and real-time information systems are applied to all busway stations [43]. An open design was adopted in the

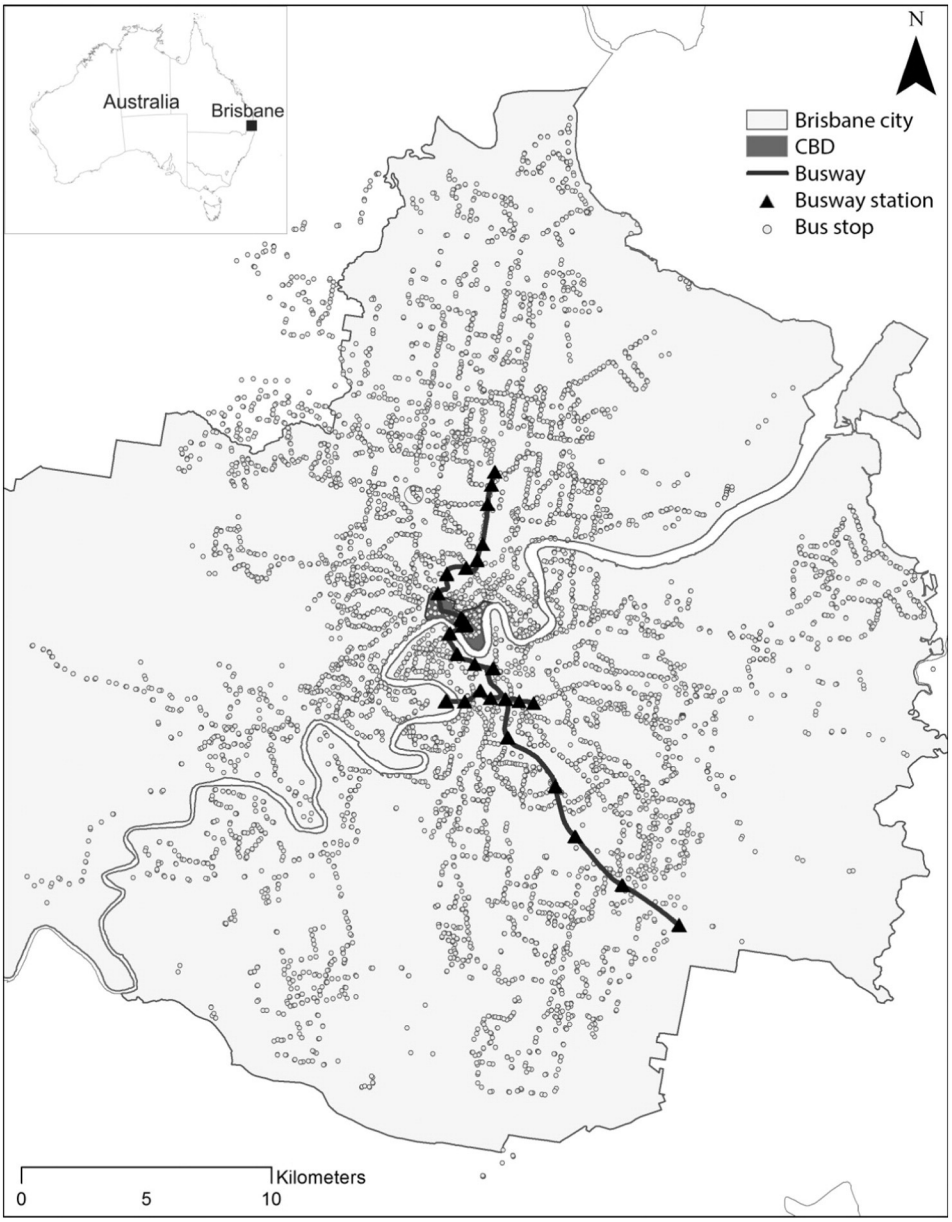

Fig. 1. The study context.

Please cite this article as: S. Tao, et al., Modelling loyalty and behavioural change intentions of busway passengers: A case study of Brisbane, Australia, IATSS Research (2016), http://dx.doi.org/10.1016/j.iatssr.2016.10.001

construction of the busway that allows on-road buses to operate on and off the busway. While the train network is located in close proximity to much of the busway, the two networks interface with one another in a somewhat limited manner in that direct transfer between train and busway is possible only at only select few busway stations, and only a scarce number of bus routes directly connect to train stations [44]. Now over 170 bus routes are either partially or fully operated on the busway network, coupled with a service frequency of approximately 260 buses during peak hours (50 buses during non-peak hours) and a highest operational speed of 80 km/h [43]. With such service characteristics Brisbane's busway network involves about two thirds of all bus trips made across Brisbane on both weekday and weekends [45]. Both the design and service of Brisbane's busway has been considered of high quality within Australia and internationally [46,47]. Given this, Brisbane's busway and its related bus services may possess the potential to enhance passengers' attitudes towards public transport (particularly bus) services and relatedly influence their loyalty within the study context.

In summary, given Brisbane's relatively low mode shares of public transport (around 8% of all trips) and the significant role of the busway network, the latter presents a suitable study context to empirically examine public transport passengers' loyalty and its relation to behavioural change intentions.

3.2. Data collection

A self-administrated questionnaire survey was designed and implemented to collect the primary data for this study. In addition to surveying socio-demographic and (past) behavioural characteristics of busway passengers, a total of 30 items (please refer to Table 2 for the items) were developed to measure busway passengers' attitudinal factors based on the review of previous literature, including [32,25,48,9,8]. Three items were developed to measure passenger loyalty and two behavioural change intentions respectively. While there are a wide range of attitudes with potential influence on public transport passengers' loyalty and behavioural change intentions, we focused mainly on four groups of attitudinal dimensions, namely previous experience with the busway service in terms of its different service attributes and overall satisfaction (12 items), attitudes towards private car use concerning its utility, comfort and cost (8 items), captivity with private car use concerning accessibility, affordability and ability to drive (3 items) and last, environmental and social concerns (4 items) to capture the moral component of modal choice behaviour. A 7-point scale was applied to record passengers' responses to these items, with 1 representing 'strongly disagree' and 7 as 'strongly agree'.

A purposive sampling design was employed to determine survey venues. The subjective criteria for this data collection were mainly twofold: the sample should include (1) public transport passengers who travel on the busway services; and, (2) busway passengers associated with a diverse range of trip-making patterns and socio-demographic characteristics. To achieve this, a set of busway stations were selected as the survey venues. Three key features were drawn upon in this procedure of selecting survey venues, including land-use patterns (the land use types and major public facilities surrounding the stations), ridership (number of boarding and alighting), and the population-weighted score of Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) of 2011 census data within the walking distance (800 m) from the busway stations [49]. The IRSAD index is one of the four Socio-Economic Indexes for Areas (SEIFA) published by the Australian Bureau of Statistics. Compared to the other three indices, its calculation draws on a more comprehensive set of socio-economic and demographic variables (e.g., income, occupation, education, household composition, dwelling type, vehicle ownership) from the census, hence better captures the collective socio-demographic and economic conditions from the most advantageous to the most disadvantageous areas across Brisbane.

The busway stations were next sorted and grouped based on their surrounding land use patterns (e.g., residential versus non-residential),

Table 1
Socio-demographic and behavioural profile of the sample.

			Proportion (%)	
		Count	This survey	SEQ survey
Gender	Male	196	42	40
	Female	273	58	59
Age	18–24	124	26	34
	25–34	139	30	23
	35–49	105	22	19
	>50	101	22	18
Relationship status	Lone person	210	45	–
	Couple family without children	151	32	–
	Couple family with child/children	108	23	–
Weekly household income (Australian dollars)	<399	74	16	–
	400–999	139	30	–
	1000–1999	144	30	–
	>2000	112	24	–
With a valid driver licence	Yes	398	85	72
	No	71	15	27
Access to a private car	Yes	345	74	45
	No	124	26	53
Years of using the busway service	0–1	68	14	
	1–3	112	24	–
	3–4.5	65	14	–
	4.5–6.5	98	21	–
	>6.5	126	27	–
Weekday use of the busway service (on an average week)	Every weekday	229	49	56
	3–4 weekday	132	28	25
	1–2 weekday	56	12	9
	Less than one weekday	52	11	7
Weekend use of the busway service (on an average month)	Every weekend	83	18	22
	2–3 weekends	86	18	20
	1 weekend	80	17	14
	Less than one weekend	220	47	39
Total		469	100	100

Please cite this article as: S. Tao, et al., Modelling loyalty and behavioural change intentions of busway passengers: A case study of Brisbane, Australia, IATSS Research (2016), http://dx.doi.org/10.1016/j.iatssr.2016.10.001

ridership (e.g., high versus low) and IRSAD scores (e.g., high versus low). Survey venues were then selected from each of the groups. While there was no pre-defined number of stations to be selected, a general rule underpinned the selection process, that fewer stations (for example, one to two) will be selected for a smaller group with homogeneous ridership and IRSADs, and vice versa. Follow this strategy, 9 busway stations were purposively selected. Between April and May, 2013, questionnaires coupled with pre-paid envelopes were distributed to passengers after seeking their verbal consent at the selected busway stations during both weekdays and weekends. Through examining the boarding and alighting time patterns at these stations, the survey was carried out to cover the time period between 8 am and 6 pm (10 am and 5 pm) on weekdays (weekends). In order to approximate the actual busway passenger market, the number of questionnaires distributed was proportional to the total number of passengers boarding and alighting at a given station for the corresponding time periods.

4. Results

The results are presented in three components. First, we describe the survey sample in terms of socio-demographic and (past) behavioural characteristics. The second part presents the results of factor analysis to reduce data dimension. Finally, the third part reports the results of a modelling exercise aimed to test the two hypotheses proposed.

4.1. Socio-demographic and behavioural profile

From the 2816 distributed questionnaires, 550 copies were returned via prepaid mail, of which 469 complete responses that then constituted the final dataset. In order to emplace our sample within the wider public transport context, the socio-demographic and behavioural characteristics were reported in juxtaposition with the results drawn from the 2010 South East Queensland (SEQ) Public Transport Survey [50] in Table 1. Recourse to the latest census was also considered in the discussion. The aim is twofold: to examine the existence of sample bias; and to identify any discernible socio-demographic patterns of the busway passengers compared to Brisbane's population.

Similar to the SEQ public transport survey, over half of our sample is female (58%) and under 35 years old (56%), both are higher than the latest census result (49% and 36% respectively for female and 35 years old and below) [38]. Approximately 23% of our sample are found to have household income within the higher range (i.e., >2000 Australian dollars per week), while 46% of Brisbane's population are shown to belong to this higher income category [38], pointing to the possibility that the busway services potentially captures a higher proportion of lower-income travellers. To examine this will require a follow-up survey to target both busway and non-busway users. In terms of access to private cars, 58% of our sample always has private car(s) at their disposal and 85% with a valid driver licence. By comparison, slightly lower proportions of persons with access to private cars (45%) and a valid driver licence (72%) were found in the SEQ survey. Yet, close to 90% of Brisbane's population has access to private cars, which exceeds that of our survey and the SEQ survey by notable margin [38]. Last, concerning behavioural characteristics, comparing this sample to the results of 2010 South East Queensland (SEQ) Public Transport Survey [50] did not show marked differences.

In summary, an examination of the sample from our survey does not indicate serious sample bias when compared against the SEQ survey. In line with previous findings, e.g., [51,33], results highlight that young, female, in the lower income brackets constituted a substantial component of the busway passengers. Yet a higher proportion of passengers with access to private cars (74% versus 45% in the SEQ survey) existed in our sample This may result from the collective influence of both limited car parking facilities at particular major destinations (e.g., the CBD) allied with the high service quality associated with the busway acting as to attract certain travellers. To investigate this, we next modelled the effects of passengers' service experience and attitudes towards car use on their loyalty towards the busway service.

4.2. Factor analysis

Factor analysis using the principle component method with a varimax rotation was conducted to the 27 items measuring the attitudes with the potential influence on public transport passengers' loyalty and behavioural change intentions to reduce data dimension. Factors with eigenvalues larger than 1 were retained; and measurement items with a factor loading lower than 0.5 were removed from the analysis. One item ('Using a private car gives one a prestigious image.') was found not to significantly load on any factors, hence was removed from the analysis. Re-conducting factor analysis on the remaining 26 items resulted in six factors, explaining 64% of the total variance of the items. It is noted that 'service cost' measured by two items ('Bus fares are cheap.' and 'The busway service is worth the money it costs me.') was distinguished from the other items measuring (busway) service experience as a stand-alone factor, which is also the case for 'car cost' being alienated from items measuring attitudes towards private car use. This suggests travel cost constitutes an important aspect of model choice decision separated from other modal use dimensions within our sample.

Table 2 presents the finalised factors (including loyalty and two behavioural change intentions) named after the associated key items, the content of the key items, factor loading and Cronbach's α. Most factors have a Cronbach's α above 0.7, supporting their construct reliability. 'Car cost', while with an Eigenvalue over 1 (= 1.12), has only one significant loading item ('Private cars are a low-cost transport mode', factor loading = 0.744). Given its potentially distinct influence on private car use in terms of dimensions such as fuel costs, parking fee, it is retained for the following analysis. Composite scores for the finalised factors are calculated using the regression method in SPSS statistics [52], wherein these scores are standardised sums of measured variables weighted on their factor score coefficients, which capture the unique contributions of measured variables to each factor.

4.3. Modelling results

Using the composite scores derived from the factor analysis, three linear regression models were developed to examine and test the two hypotheses proposed in Section 2. In addition to the attitudinal variables as independent variables, socio-demographic and behavioural characteristics were controlled for as well.

A multiple regression using the Ordinal Least Square (OLS) method was first computed. While statistically significant model-fit was obtained, the result of a Breusch-Pagan test suggested that there was heteroscedasticity. To address this issue, a regression model using robust standard errors was employed instead. The advantage of doing so is that the estimation of robust standard errors relaxes the assumption of the OLS method that residuals are independent and identically distributed, hence is able to generate a more reliable estimation especially regarding the significance of the coefficients [53,54].

Recomputing the model again achieved significant model-fit with adjusted $R^2 = 0.512$ (Table 3). For the most (over 85%) of the independent variables, their Variance Inflation Factor (VIF) values were between 1 and 2, and the remaining cases between 2 and 3, largely indicating the absence of a multicollinearity issue. In line with previous studies, e.g., [9,8,32], strong positive effects were found for 'service experience' and 'service cost' with respect to busway use ($\beta = 0.541$ and 0.311 respectively), and to a lesser extent, 'environmental concerns' ($\beta = 0.242$), pointing to the situation that higher service quality of public transport and pro-environmental attitudes collectively encourage busway usage.

Significant effects were also found for the factors capturing attitudes towards private car use. First, partially echoing our hypotheses, 'car cost' was found to negatively relate to loyalty ($\beta = -0.153$), suggesting the

Please cite this article as: S. Tao, et al., Modelling loyalty and behavioural change intentions of busway passengers: A case study of Brisbane, Australia, IATSS Research (2016), http://dx.doi.org/10.1016/j.iatssr.2016.10.001

Table 2
Results of factor analysis.

Finalised factors	Key item(s)	Factor loading	Cronbach's α
Loyalty	I am willing to continue to use the busway service.	–	–
Intention to shift to private car use	I am willing to use a private car instead of the busway service for more of my regular trips in Brisbane.	–	–
Intention to increase the busway service use	I am willing to increase my use of the busway service for my regular trips in Brisbane.	–	–
Service experience	Riding the busway service is safe.	0.601	0.878
	The busway service is frequent.	0.723	
	The busway service is on time.	0.68	
	Riding the busway service is comfortable.	0.723	
	The busway stations are well-equipped.	0.703	
	The busway stations are easy to get to.	0.671	
	Riding the busway service saves time.	0.668	
	Bus drivers are always friendly.	0.545	
	The busway service is worth the time I use it.	0.657	
	Overall I am satisfied with the busway service.	0.766	
Service cost	Bus fares are cheap.	0.874	0.793
	The busway service is worth the money it costs me.	0.807	
Car utility	Private cars are a reliable transport mode.	0.733	0.82
	Private cars are a flexible transport mode.	0.77	
	Private cars are a time-saving transport mode.	0.606	
	Private cars are a safe transport mode.	0.65	
	Using a private car is comfortable.	0.84	
	Using a private car is enjoyable.	0.697	
Car cost	Private cars are a low-cost transport mode.	0.744	–
Car captivity	If I want to use a private car in Brisbane, one is always available.	0.842	0.783
	I am confident in driving a private car in Brisbane.	0.766	
	For me, driving a private car in Brisbane is affordable.	0.807	
Environment concerns	I strongly feel using the busway service is a way to reduce environmental pollution.	0.813	0.861
	I strongly feel using the busway service is a way to reduce traffic problems.	0.783	
	I strongly feel using a car too much will increase environmental problems.	0.842	
	I strongly feel using a car too much will increase traffic problems.	0.855	

higher costs of using cars (e.g., fuel price, parking fees) may prompt some travellers to use busway services for some of their trips. Somewhat unexpectedly, 'car utility', and at a marginal level ($p < 0.1$), 'car captivity', were found to be positively related with loyalty ($\beta = 0.197$ and 0.121 respectively). While it cannot be confirmed through this particular study, our results point to the situation that within a car-oriented context such as Brisbane, a majority of the survey population views cars as a favourable and convenient travel option, that underscores the positive relations observed between loyalty and 'car utility'.

Last, some modest effects of socio-demographic and behavioural variables were detected at a $p < 0.05$ or 0.1 level. Particularly, slightly lower loyalty was associated with passengers characterised by couple family without children and using the busway service, and marginally higher loyalty was found for female passengers.

In modelling busway passengers' intention to shift to private car use and intention to increase the busway service use, loyalty along with the other independent variables also was included. No severe multicollinearity issues were raised following an examination of the VIF values (only one set of VIF values are displayed here given that they are exactly the same across both models). Running Breusch-Pagan test yielded insignificant results, suggesting the absence of heteroscedasticity. Lower model fit was obtained for both models (adjusted $R^2 = 0.231$ and 0.189 respectively) (Table 4). Yet some effects revealed are worth examination and further discussion.

For passengers' intention to shift to private car use, all three variables related to private car use ('car utility', 'car captivity' and 'car cost') were found to have significant effects with expected directions ($\beta = 0.28$, 0.22 and 0.16 at a $p < 0.001$ level). 'Service experience' and 'service cost', on the other hand, were found with no marked influence on this intention. However, in accordance with our second hypothesis, negative effects were found for loyalty ($\beta = -0.165$) and 'environment concerns' ($\beta = -0.123$) both a $p < 0.005$ level. Among socio-demographic and behavioural variables, a noticeable negative relation was observed for age ($\beta = -0.151$), whilst a series of modest differences were detected for a number of other variables, including moderate to higher household income variables, associated with lower intention to shift to private car use, and two weekend busway use variables (using the busway service for 3–4 weekdays or less than one weekday on an average week) with slightly higher intention to do so.

Table 3
Results of modelling loyalty.

	Loyalty		
	β	t	VIF
Attitudinal variables			
Service experience	0.541***	13.73	1.12
Service cost	0.311***	7.57	1.14
Car utility	0.197***	4.78	1.1
Car captivity	0.121*	1.78	2.01
Car cost	−0.153***	4.46	1.03
Environment concerns	0.242***	6.26	1.03
Socio-demographic and behavioural variables			
Age	−0.016	0.42	1.68
Female (=1)	0.067*	1.97	1.07
Couple without children (=1)	−0.095*	2.5	1.46
Couple with child/children (=1)	−0.072	1.73	1.68
Weekly household income 400–999 dollars (=1)	−0.024	0.49	2.29
Weekly household income 1000–1999 dollars (=1)	0.027	0.46	2.66
Weekly household income 2000 dollars and above (=1)	0.034	0.62	2.66
Without a valid driver licence (=1)	−0.001	0.0.4	1.48
Without access to a private car (=1)	0.053	0.84	2.27
Years of using the busway service	0.004	0.08	1.25
3–4 weekdays of using the busway service (=1)	−0.002	0.06	1.2
1–2 weekdays of using the busway service (=1)	−0.073*	1.82	1.19
Less than one weekday of using the busway service (=1)	−0.047	1.35	1.41
Every weekend of using the busway service (=1)	0.055	1.07	1.86
2–3 weekends of using the busway service (=1)	0.019	0.53	1.49
One weekend a month of using the busway service (=1)	0.069°	1.92	1.25
Model fit			
Adjusted R^2	0.521		
F(df = 22, 446)	17.73		

*** $p < 0.001$.
* $p < 0.05$.
° $p < 0.1$.

Please cite this article as: S. Tao, et al., Modelling loyalty and behavioural change intentions of busway passengers: A case study of Brisbane, Australia, IATSS Research (2016), http://dx.doi.org/10.1016/j.iatssr.2016.10.001

Table 4
Results of modelling intentions to change modal use.

	Intention to shift to private car use		Intention to increase the busway service use		VIF
	β	t	β	t	
Attitudinal variables					
Loyalty	-0.165**	2.818	0.112°	1.86	2.09
Service experience	-0.074	1.392	0.202***	3.696	1.733
Service cost	-0.008	0.18	0.141**	2.931	1.34
Car utility	0.28***	6.352	−0.071	1.565	1.178
Car captivity	0.22***	3.8	−0.051	0.086	2.037
Car cost	0.16***	3.79	−0.033	0.764	1.084
Environmental concerns	−0.123**	2.826	0.144***	3.221	1.156
Socio-demographic and behavioural variables					
Age	−0.151**	2.865	−0.041	0.753	1.681
Female (=1)	0.021	0.504	−0.013	0.309	1.079
Couple without children (=1)	−0.006	0.12	0.007	0.135	1.475
Couple with child/children (=1)	−0.098°	1.859	−0.006	0.108	1.69
Weekly household income 400–999 dollars (=1)	−0.166*	2.71	0.005	0.074	2.288
Weekly household income 1000–1999 dollars (=1)	−0.144*	2.173	−0.011	0.161	2.663
Weekly household income 2000 dollars and above (=1)	−0.113°	1.715	−0.127°	1.87	2.662
Without a valid driver licence (=1)	0.004	0.09	−0.05	0.988	1.482
Without access to a private car (=1)	0.101°	1.651	−0.033	0.528	2.09
Years of using the busway service	0.013	0.287	−0.052	1.106	1.253
3–4 weekdays of using the busway service (=1)	0.107*	2.407	0.095*	2.088	1.195
1–2 weekdays of using the busway service (=1)	0.069	1.556	0.098*	2.156	1.201
Less than one weekday of using the busway service (=1)	0.117*	2.419	0.101*	2.035	1.419
Every weekend of using the busway service (=1)	−0.059	1.066	0.151**	2.651	1.865
2–3 weekends of using the busway service (=1)	−0.038	0.733	0.089°	1.741	1.492
One weekend a month of using the busway service (=1)	0	0.001	0.083°	1.784	1.262
Model fit					
Adjusted R^2	0.231		0.189		
F(df = 23, 445)	7.102		5.75		

*** $p < 0.001$
** $p < 0.005$
* $p < 0.05$
° $p < 0.1$

Concerning passengers' intention to increase their busway service use, positive effects were found for 'service experience' ($\beta = 0.202$), 'service cost' ($\beta = 0.141$) and 'environment concerns' ($\beta = 0.144$) at a $p < 0.001$ or 0.005 level, while all private car-use related variables were insignificant. A positive yet less significant effect (at a $p < 0.1$ level) was found for loyalty, hence to a small degree supporting our hypothesis concerning its effect on this intention of increasing busway use. A number of differences of this intention were also revealed among passengers with different levels of weekday and weekend busway use. Among these differences, passengers with 'every weekend of using the busway service' stood out with significantly higher intention to increase their busway use. By comparison, other differences were relatively marginal.

Last, in order to examine the impacts of the specific busway attributes e on passengers' loyalty, a stepwise regression model using robust standard error was computed that drew on survey items measuring service experience (refer to Table 2). The criterion for the independent variable addition was set at the 0.05 level, and the removal criterion at the 0.1 level. Four items were retained in the final model, explaining 36% of the variance of loyalty (Table 5). The modelling results highlight that frequency of busway service exerts the largest effect on loyalty, followed by safety, comfort and time-saving. This finding is plausible, given that more frequent public transport service may reduce waiting and transfer times for passengers, which has long been found to be onerous for passengers [55,56]. In the same vein with frequency, the significant effect found for the time-saving term may also be explained by passengers' interest in reducing burden from daily trip-making. Finally, in line with some previous studies, e.g., Hutchinson [57], Tyrinopoulos and Antoniou [58], we found that in addition to the 'hard' aspect (captured by travel time), some 'soft' dimensions of using the busway service, particularly safety and comfort, are also of notable value to passengers.

Table 5
Results from regressing busway service attributes on passenger loyalty.

	Loyalty		
	β	t	VIF
Variables			
The busway service is frequent.	0.322	3.96	1.566
Riding the busway service is safe.	0.213	3.38	1.499
Riding the busway service is comfortable.	0.123	2.32	1.448
Riding the busway service saves time.	0.104	2	1.358
Model fit			
Adjusted R^2	0.359		
F(df = 4, 464)	43.65		

5. Discussion

Outgrowing our reliance on private cars and encouraging shift towards more sustainable transport alternatives would in part entail an improved understanding of the nature of public transport passenger loyalty. Using a survey-based research design on Brisbane' busway system, this study was able to investigate public transport passengers' loyalty by placing emphasis on modelling its relationship to passengers' captivity and attitudes towards private car use, and their behavioural change intentions concerning their future public transport and private car use. The study results revealed a series of significant relationships

Please cite this article as: S. Tao, et al., Modelling loyalty and behavioural change intentions of busway passengers: A case study of Brisbane, Australia, IATSS Research (2016), http://dx.doi.org/10.1016/j.iatssr.2016.10.001

that herald the potential for the improvement of public transport and travel demand management to encourage more sustainable transport.

First, busway passengers' loyalty was revealed to be influenced primarily by a preferential component, and to a lesser extent, a constraint component. Allied with previous studies investigating the loyalty-service experience relationship [7–9,59], the preferred component is reflected by a strong positive effect imposed by passengers' service experience with the busway. The constrained part appears to be largely related to the costs of both busway and private car use, which partially is in line with the previous studies drew on the utility maximisation framework to understand individuals' modal choice behaviour [34,60]. Furthermore, the positive effect found for environment concerns regarding modal use affirms the moral aspect of public transport use [31,32]. Less expectedly, positive effects were found for 'car utility' and 'car captivity' on loyalty, which, we contend, may to a degree reflect the highly car-oriented cultural context of Brisbane. Finally, through a supplementary modelling exercise, frequency, time-saving, safety and comfort were each found to act as key service attributes influencing busway passengers' loyalty, that collectively call for attention from the operator if attempts to improve the busway service are to be made.

Our findings concerning busway passengers' loyalty suggest that in addition to enhancing passengers' experience with the busway service (in terms of aspects including reliability, time-saving and comfort), public transport providers may undertake a number of interventions to: 1) reduce service costs; 2) raise passengers' environmental concerns, and 3) constrain private car use to further reinforce passengers' loyalty towards busway-based services. Each now is discussed.

First, regarding reducing service costs, currently implemented in place is the 'make 9 journeys then travel free' scheme that allows people to travel free by public transport after making 9 journeys within a week [61]. While this might to a degree encourage public transport use, we argue that its effect is likely to be limited, given that a related study found around 10% of public transport users ride the busway service on a relatively frequent basis (3 weekdays or more over one week) across Brisbane [62]. Given this, a more relaxed scheme (for example, make 5 journeys then travel on a certain discount) may be more desirable to encourage busway usage. A comprehensive examination of the elasticity of demand is needed prior to implementing such a strategy. Second, with respect to raising environmental concerns, disseminating information (e.g., through physical or online brochures) regarding the environmental benefits of riding public transport appears to be a viable option. Previously small to moderate scale programs employing such an information-based approach have been implemented in some Australian cities (including Brisbane), with marked increases in public transport use reported at a neighbourhood level [63,64]. Given this, this approach is arguably applicable to the busway network within our study context. Last, based on our findings, constraining private car use may be more effective if framed as a transport pricing measure (e.g., raising parking and fuel costs). In this regard, Brisbane has imposed high parking fees particularly within its CBD, which arguably reduced the attractiveness of driving to the city centre for the public [65]. In addition to this, other types of pricing strategies could also be implemented, for example, introducing a congestion pricing system that varies based on different times of day (e.g., higher during peak hours while lower during non-peak hours).

Computing models of passengers' intentions to change modal use produces some additional implications for busway operators in Brisbane and potentially other public transport providers within highly motorised cities. Modelling passengers' willingness to shift to private car use indicates that in addition to evoking passengers' pro-environment responsibility in terms of their modal use, reinforcing passengers' loyalty is to some degree affirmed to be a potentially encouraging strategy to balance people's future private car and non-car use, and consequently alleviate car-dependency, given its negative effect on this modal shift intention. Hence, we suggest that passenger loyalty is worth pursuing from this angle within the study context. Passengers' intention to increase their use of the busway service, on the other hand, is found to be moderately influenced by passengers' experience and cost of using the busway-based service, and their pro-environment responsibility, while bearing little association with private car use attitude and captivity. Given this, we argue that increasing existing passengers' busway use is overall a more difficult task compared to maintaining their loyalty (and possibly their current use of the busway service), and not worth pursuing especially when there is relatively limited budget for public transport operation and management.

Some differences of behavioural change intentions detected across socio-demographic and behavioural characteristics also contain targeted transport implications. Particularly, younger and lower income (i.e., weekly household income 399 Australian dollars and less) passengers showed higher intention to shift to private car use; and passengers using the busway service on every weekend showed higher willingness to increase their current busway use. As for the younger passengers, this observation is quite plausible: their use of the busway service may largely relate to their current life-stage (e.g., studying in a tertiary institute), which may be about to change (e.g., leaving childhood home after graduating). Hence younger passengers may expect shift in their travel patterns in the near future (e.g., using cars for more trips). For this group, providing updated information of busway-based service appears to the proper initial step to maintain their loyalty. It however is noted that given there has been a very recent trend of young people delaying obtaining their driver licence [66], further investigation of this cohort of travellers is needed to confirm our findings. The lower income passengers who are more likely to be captive passengers, as revealed by [67,68], tend to improve their overall mobility by balancing their multimodal use (e.g., increasing private car use). For this group, carpooling may be encouraged to meet their travel needs not easily met by the busway-based service. However, if carpooling becomes difficult given the potentially dispersed set of destinations, alternative options, for example, mini-bus services or ridesharing schemes (e.g., Uber), may be utilised to overcome such issues. Finally, concerning the weekend busway passengers, it would be worthwhile to identify their current trips that may potentially be covered by the busway-based service and provide service information (route and timetable) accordingly.

The study's limitations offer five opportunities for future research. First, our study drew on a relatively small sample of survey respondents. While no severe bias was found in this sample, it would be worthwhile to draw on larger samples of the busway passengers to test the findings reported in this study. Second, only 23.1 and 18.9% of intention to shift to private car use and intention to increase busway use were accounted for respectively in our modelling exercise. Given this, it appears reasonable for future research to add other attitudinal variables, such as passengers' preference for residential locations and long-term values [69] to further explore these two intentions. Third, this study solely focused on existing busway passengers, whilst non-users fell outside the scope. Some previous research revealed that current and non-public transport users might react very differently to information that promotes sustainable travel behaviour, e.g., [70,71]. Therefore it would be worthwhile to re-apply our research to non-busway users to capture their behavioural intentions and related attitudinal dimensions. Related to the previous point, the fourth avenue for future research is to test the role of car use habit in influencing non-public transport users' intention to use public transport. As highlighted in some previous research, car use habit can considerably prohibit public transport use especially for those who rely on private cars to make everyday trips and is rather difficult to break, e.g., [72,73]. Addressing this issue therefore has the potential to indicate more targeted approaches to promote public transport use among car users [74]. Last but not least, as with other cross-sectional studies, the results of this study can be considered as more correlational rather than causal (particularly the effects of passengers' loyalty and car use attitudes). As such, it would be worthwhile to apply a panel research design in future research, e.g., [72], to build on our findings and better capture the causal relationships between

Please cite this article as: S. Tao, et al., Modelling loyalty and behavioural change intentions of busway passengers: A case study of Brisbane, Australia, IATSS Research (2016), http://dx.doi.org/10.1016/j.iatssr.2016.10.001

busway passengers' attitudes, intentions and actual public transport and private car use.

6. Conclusion

This study advances our understanding of public transport passengers' loyalty within the broader modal choice behaviour framework. Through a series of modelling exercises, we highlighted that within a highly motorised city context: (1) passengers' loyalty towards a high quality public transport service (i.e., the busway service) were subject to the influence from their experience of using the service, pro-environmental concerns and the attitudes towards private car use (particularly relating to the cost of car use); and (2) passengers loyalty might has the potential to restrain their intention to shift to car use. From these findings, a series of implications for busway service management aimed at encouraging sustainable transport modal choice use were developed. There is potential for further travel behaviour research to re-validate and extend our findings on public transport passengers' loyalty and behavioural change intentions in diverse contexts, to provide useful knowledge on the link between loyalty and attitudes towards private car as we progress towards achieving sustainable transportation.

References

[1] P. Newman, J. Kenworthy, Costs of automobile dependence: global survey of cities, Transp. Res. Rec. : J. Transp. Res. Board 1670 (1) (1999) 17–26.
[2] D. Banister, Cities, mobility and climate change, J. Transp. Geogr. 19 (6) (2011) 1538–1546.
[3] M.D. Meyer, Demand management as an element of transportation policy: using carrots and sticks to influence travel behavior, Transp. Res. A Policy Pract. 33 (7–8) (1999) 575–599.
[4] J. Richter, M. Friman, T. Gärling, Soft transport policy measures: gaps in knowledge, Int. J. Sustain. Transp. 5 (4) (2011) 199–215.
[5] P. Foote, D. Stuart, R. Elmore-Yalch, Exploring customer loyalty as a transit performance measure, Transp. Res. Rec.: J. Transp. Res. Board **1753** (−1) (2001) 93–101.
[6] E.J. Miller, et al., A handbook for measuring customer satisfaction and service quality. Vol. TCRP Report 47, Transp. Res. Board (1999).
[7] W. Jen, T.J. Lu, Effects of service quality, customer satisfaction and switching barriers on passenger behavioral intentions in scheduled coach service, Proceedings of the Eastern Asia Society for Transportation Studies, 2003.
[8] W.-T. Lai, C.-F. Chen, Behavioral intentions of public transit passengers—the roles of service quality, perceived value, satisfaction and involvement, Transp. Policy 18 (2) (2011) 318–325.
[9] W. Jen, R. Tu, T. Lu, Managing passenger behavioral intention: an integrated framework for service quality, satisfaction, perceived value, and switching barriers, Transportation 38 (2) (2011) 321–342.
[10] J. Minser, V. Webb, Quantifying the benefits, Transp. Res. Rec.: J. Transp. Res. Board 2144 (1) (2010) 111–120.
[11] S. Figler, et al., Customer loyalty and Chicago, Illinois, transit authority buses, Transp. Res. Rec.: J. Transp. Res. Board 2216 (1) (2011) 148–156.
[12] D.A. Hensher, The imbalance between car and public transport use in urban Australia: why does it exist? Transp. Policy 5 (4) (1998) 193–204.
[13] L. Steg, Can public transport compete with the private car? IATSS Res (Int Assoc Traffic Saf Sci) 27 (2) (2003) 27–35.
[14] D. Banister, The sustainable mobility paradigm, Transp. Policy 15 (2) (2008) 73–80.
[15] R.L. Oliver, Whence consumer loyalty? J. Mark. **63** (1999) 33–44 (ArticleType: research-article/Issue Title: Fundamental Issues and Directions for Marketing/Full publication date: 1999 / Copyright © 1999 American Marketing Association).
[16] A. Dick, K. Basu, Customer loyalty: toward an integrated conceptual framework, J. Acad. Mark. Sci. 22 (2) (1994) 99–113.
[17] C. Liao, J.-L. Chen, D.C. Yen, Theory of planning behavior (TPB) and customer satisfaction in the continued use of e-service: an integrated model, Comput. Hum. Behav. 23 (6) (2007) 2804–2822.
[18] R.L. Oliver, Satisfaction: A Behavioral Perspective on the Customer. New York, 1997.
[19] F. Wilson, A. Stevens, J. Robinson, Identifying mode choice constrained urban travel market segments, Can. J. Civ. Eng. 11 (4) (1984) 924–932.
[20] S. Polzin, X. Chu, J. Rey, Density and captivity in public transit success: observations from the 1995 Nationwide Personal Transportation Study, Transp. Res. Rec.: J. Transp. Res. Board **1735** (−1) (2000) 10–18.
[21] G. Giuliano, Low income, public transit, and mobility, Transp. Res. Rec.: J. Transp. Res. Board **1927** (−1) (2005) 63–70.
[22] M. Jensen, Passion and heart in transport—a sociological analysis on transport behaviour, Transp. Policy 6 (1) (1999) 19–33.
[23] J. Anable, `Complacent car addicts' or `aspiring environmentalists'? Identifying travel behaviour segments using attitude theory, Transp. Policy 12 (1) (2005) 65–78.
[24] C. Jacques, K. Manaugh, A. El-Geneidy, Rescuing the captive [mode] user: an alternative approach to transport market segmentation, Transportation 40 (3) (2013) 625–645.
[25] C.H. Wen, L.W. Lan, H.L. Cheng, Structural equation modeling to determine passenger loyalty toward intercity bus services, Transp. Res. Rec.: J. Transp. Res. Board 1927 (1) (2005) 249–255.
[26] W. Jen, K.-C. Hu, Application of perceived value model to identify factors affecting passengers' repurchase intentions on city bus: a case of the Taipei metropolitan area, Transportation 30 (3) (2003) 307–327.
[27] T. Joewono, H. Kubota, User satisfaction with paratransit in competition with motorization in Indonesia: anticipation of future implications, Transportation 34 (3) (2007) 337–354.
[28] I. Ajzen, The theory of planned behavior, Organ. Behav. Hum. Decis. Process. 50 (2) (1991) 179–211.
[29] S.H. Schwartz, Normative influences on altruism, Adv. Exp. Soc. Psychol. 10 (1977) 221–279.
[30] Y. Heath, R. Gifford, Extending the theory of planned behavior: predicting the use of public Transportation1, J. Appl. Soc. Psychol. 32 (10) (2002) 2154–2189.
[31] C. Collins, S. Chambers, Psychological and situational influences on commuter-transport-mode choice, Environ. Behav. 37 (5) (2005) 640–661.
[32] S. Bamberg, M. Hunecke, A. Blöbaum, Social context, personal norms and the use of public transportation: two field studies, J. Environ. Psychol. 27 (3) (2007) 190–203.
[33] A. Simma, K.W. Axhausen, Structures of commitment in mode use: a comparison of Switzerland, *Germany and Great Britain*, Transp. Policy 8 (4) (2001) 279–288.
[34] M.E. Ben-Akiva, S.R. Lerman, Discrete choice analysis: theory and application to travel demand, Vol. 9, MIT press, 1985.
[35] N.J.A. Van Exel, P. Rietveld, Could you also have made this trip by another mode? An investigation of perceived travel possibilities of car and train travellers on the main travel corridors to the city of Amsterdam, The Netherlands, Transp. Res. A Policy Pract. 43 (4) (2009) 374–385.
[36] B. Gardner, C. Abraham, Going green? Modeling the impact of environmental concerns and perceptions of transportation alternatives on decisions to drive, J. Appl. Soc. Psychol. 40 (4) (2010) 831–849.
[37] D.D. Gremler, S.W. Brown, Service loyalty: its nature, importance, and implications, in: B. Edvardsson, et al., (Eds.), Advancing Service Quality: A Global Perspective, ISQA, New York, 1996.
[38] ABS, Census QuickStats,. 2013 [cited 2013 18th, November]Available from: http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/0?opendocument&navpos=220.
[39] Brisbane City Council, Transport Plan for Brisbane, 2008 (Brisbane, Australia).
[40] BITRE, in: BITRE (Ed.), Urban Public Transport: Updated Trends, 2014 Canberra.
[41] Department of Transport and Main Roads, Busways[cited 2013 6th, June]; Available from: http://www.tmr.qld.gov.au/Projects/Name/B/Busways.aspx.
[42] Translink, Public transport infrastructure manual[cited 2013 July]; Available from: http://translink.com.au/sites/default/files/assets/resources/about-translink/what-we-do/infrastructure-projects/public-transport-infrastructure-manual/2012-05-public-transport-infrastructure-manual.pdf.
[43] G. Currie, A. Delbosc, Bus rapid transit in Australasia: an update on progress, Built Environ. 36 (3) (2010) 328–343.
[44] C. Mulley, et al., Residential property value impacts of proximity to transport infrastructure: an investigation of bus rapid transit and heavy rail networks in Brisbane, *Australia*, J. Transp. Geogr. 54 (2016) 41–52.
[45] S. Tao, et al., Exploring bus rapid transit passenger travel behaviour using big data, Appl. Geogr. 53 (2014) 90–104.
[46] A. Hoffman, Advanced Network Planning for Bus Rapid Transit: The "Quickway" Model as a Modal Alternative to "Light Rail Lite", TRIS, 2008.
[47] T. Deng, J.D. Nelson, Recent developments in bus rapid transit: a review of the literature, Transp. Rev. 31 (1) (2010) 69–96.
[48] L. Steg, Car use: lust and must. Instrumental, symbolic and affective motives for car use, Transp. Res. A Policy Pract. 39 (2–3) (2005) 147–162.
[49] ABS, Socio-economic indexes for areas[cited 2014 May]; Available from: http://www.abs.gov.au/websitedbs/censushome.nsf/home/seifa.
[50] TransLink, Public Transport User Survey Summary, Q. Government, Editor, 2010 Brisbane, Australia.
[51] R. Kitamura, P.L. Mokhtarian, L. Daidet, A micro-analysis of land use and travel in five neighborhoods in the San Francisco Bay Area, Transportation 24 (2) (1997) 125–158.
[52] A. Field, Discovering Statistics Using SPSS, Sage publications, 2009.
[53] W.D. Berry, S. Feldman, Multiple Regression in Practice, Sage, 1985.
[54] D. Hoechle, Robust standard errors for panel regressions with cross-sectional dependence, Stata J. 7 (3) (2007) 281–312.
[55] M. Wardman, Public transport values of time, Transp. Policy 11 (4) (2004) 363–377.
[56] J. Hine, J. Scott, Seamless, accessible travel: users' views of the public transport journey and interchange, Transp. Policy 7 (3) (2000) 217–226.
[57] T.P. Hutchinson, The customer experience when using public transport: a review, Proc. Inst. Civ. Eng.: Mun. Eng. 162 (3) (2009) 149–157.
[58] Y. Tyrinopoulos, C. Antoniou, Public transit user satisfaction: variability and policy implications, Transp. Policy 15 (4) (2008) 260–272.
[59] E. St-Louis, et al., The happy commuter: a comparison of commuter satisfaction across modes, Transport. Res. F: Traffic Psychol. Behav. **26** (2014) 160–170 **Part A**(0).
[60] M. Ben-Akiva, M. Bierlaire, Discrete choice methods and their applications to short term Travel decisions, in: R. Hall (Ed.), Handbook of Transportation Science, Springer US 1999, pp. 5–33.
[61] TransLink, Make 9 journeys then travel free[cited 2016 June]; Available from: https://translink.com.au/tickets-and-fares/fares/go-frequently-then-go-for-free.
[62] S. Tao, Investigating the travel behaviour dynamics of bus rapid transit passengers, School of Geography, Planning and Environmental Management, Brisbane, The University of Queensland, 2015.

Please cite this article as: S. Tao, et al., Modelling loyalty and behavioural change intentions of busway passengers: A case study of Brisbane, Australia, IATSS Research (2016), http://dx.doi.org/10.1016/j.iatssr.2016.10.001

[63] D. Freer, P. Henderson, A. Cubie, 324,000 people can't be wrong-evaluating the world's largest individualised marketing project, Australasian Transport Research Forum, 2010 Canberra.
[64] M.A.P. Taylor, Voluntary travel behavior change programs in Australia: the carrot rather than the stick in travel demand management, Int. J. Sustain. Transp. 1 (3) (2007) 173–192.
[65] M. Calligeros, Brisbane CBD parking is Asia's third most expensive[cited 2016 June]; Available from: http://www.brisbanetimes.com.au/queensland/brisbane-cbd-parking-is-asias-third-most-expensive-20110502-1e5ky.html.
[66] A. Delbosc, Why are young Australians turning their back on the car? The conversation 2015 [cited 2016 June]Available from: https://theconversation.com/why-are-young-australians-turning-their-back-on-the-car-35468.
[67] M. Diana, P. Mokhtarian, Grouping travelers on the basis of their different car and transit levels of use, Transportation 36 (4) (2009) 455–467.
[68] M. Diana, P.L. Mokhtarian, Desire to change one's multimodality and its relationship to the use of different transport means, Transport. Res. F: Traffic Psychol. Behav. 12 (2) (2009) 107–119.
[69] V. Van Acker, B. Van Wee, F. Witlox, When transport geography meets social psychology: toward a conceptual model of travel behaviour, Transp. Rev. 30 (2) (2010) 219–240.
[70] E. Ampt, Understanding voluntary travel behaviour change, Transp. Eng. Aust. 9 (2) (2004) 53–66.
[71] J.R. Beale, P.W. Bonsall, Marketing in the bus industry: a psychological interpretation of some attitudinal and behavioural outcomes, Transport. Res. F: Traffic Psychol. Behav. 10 (4) (2007) 271–287.
[72] J. Thøgersen, Understanding repetitive travel mode choices in a stable context: a panel study approach, Transp. Res. A Policy Pract. 40 (8) (2006) 621–638.
[73] J. Thøgersen, B. Møller, Breaking car use habits: the effectiveness of a free one-month travelcard, Transportation 35 (3) (2008) 329–345.
[74] Ö. Şimşekoğlu, T. Nordfjærn, T. Rundmo, The role of attitudes, transport priorities, and car use habit for travel mode use and intentions to use public transportation in an urban Norwegian public, Transp. Policy 42 (2015) 113–120.

Please cite this article as: S. Tao, et al., Modelling loyalty and behavioural change intentions of busway passengers: A case study of Brisbane, Australia, IATSS Research (2016), http://dx.doi.org/10.1016/j.iatssr.2016.10.001